

CLAIMS

1. A welding method for manufacturing welded structures having excellent properties to prevent the propagation of brittle fracture occurring in welded joints, characterized by the step of forming a repair weld having a greater toughness than that of a butt weld and an outer edge whose angle ϕ , with respect to the longitudinal direction of the butt weld, is not less than 10 degrees and not more than 60 degrees, by applying repair welding to a region to arrest a brittle crack in a butt-welded joint where a brittle crack is likely to propagate after removing part of the butt-welded joint in said region by gouging or machining.

2. The welding method for manufacturing welded structures having excellent properties to prevent the propagation of brittle fracture described in claim 1, in which the toughness in said repair weld is at least 20 °C lower than the brittle-to-ductile fracture transition temperature vT_{rs} of the butt-welded joint.

3. The welding method for manufacturing welded structures having excellent properties to prevent the propagation of brittle fracture described in claim 1 or 2, in which said repair weld is provided by applying repair welding to the pertinent region after removing 1/2 or more of plate thickness from either or both sides of the butt-welded joint by gouging or machining.

4. The welding method for manufacturing welded structures having excellent properties to prevent the propagation of brittle fracture described in any of claims 1 to 3, in which compressive residual stress not less than 1/2 of the yield stress of the welded member is developed in a direction perpendicular to the longitudinal direction of the butt weld in a region where said repair weld and butt-welded joint are in contact.

5. The welding method for manufacturing welded structures having excellent properties to prevent the propagation of brittle fracture described in any of

claims 1 to 4, in which repair welding is applied by controlling so that the angle θ of the longitudinal direction of at least the last layer of the repair weld bead with respect to the longitudinal direction of the butt weld is not greater than 80 degrees.

6. The welding method for manufacturing welded structures having excellent properties to prevent the propagation of brittle fracture described in any of claims 1 to 5, in which repair welding is applied by controlling so that the angle ϕ of the outer edge of the butt weld with respect to the longitudinal direction of the butt weld is not less than 10 degrees and not more than 45 degrees.

7. A welded structure having excellent properties to prevent the propagation of brittle fracture occurring in welded joints, characterized by that the welded structure has a repair weld having a greater toughness than that of a butt weld and an outer edge whose angle ϕ with respect to the longitudinal direction of the butt weld is not less than 10 degrees and not more than 60 degrees in a region to arrest a brittle crack in butt-welded joints where a brittle crack is likely to propagate.

8. The welded structure having excellent properties to prevent the propagation of brittle fracture as described in claim 7, in which the toughness in said repair weld is at least 20 °C lower than the brittle-to-ductile fracture transition temperature $vTrs$ of the butt-welded joint.

9. The welded structure having excellent properties to prevent the propagation of brittle fracture as described in claim 7 or 8, in which said repair weld is provided by applying repair welding to the pertinent region after removing 1/2 or more of plate thickness from either or both sides of the butt-welded joint by gouging or machining.

10. The welded structure having excellent properties to prevent the propagation of brittle fracture as described in any of claims 7 to 9, in which compressive residual stress not less than $1/2$ of the yield stress of the welded member is developed in a direction perpendicular to the longitudinal direction of the butt weld in a region where said repair weld and butt-welded joint are in contact.

11. The welded structure having excellent properties to prevent the propagation of brittle fracture as described in any of claims 7 to 10, in which the angle θ of the longitudinal direction of at least the last layer of the repair weld bead with respect to the longitudinal direction of the butt weld is not greater than 80 degrees.

12. The welded structure having excellent properties to prevent the propagation of brittle fracture as described in any of claims 7 to 11, in which the angle ϕ of the outer edge of the butt weld with respect to the longitudinal direction of the butt weld is not less than 10 degrees and not more than 45 degrees.